Forest Research Notes

Northeastern Forest

REST SERVICE, U S DEPT. OF AGRICULTURE 102 MOTORS AVENUE, UPPER DARBY, PA

Experiment Station

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A TIME-CORRECTOR DEVICE FOR ADJUSTING STREAMFLOW RECORDS

The first job in compiling streamflow data from streamflow charts is to mark storm rises and storm peaks, make corrections as necessary for time and stage height, and account for irregularities on the chart. Errors in the time scale can result from faulty clock operation, irregularities in chart take-up by the drum, or expansion of the paper. This note suggests a device for making rapid and accurate time corrections.

In preparing streamflow records at the Hubbard Brook Experimental Forest in West Thornton, N.H., time corrections are made if the chart time is more than 15 minutes in error at the end of a 2-week period. On the Stevens A-35 chart, used at Hubbard Brook, corrections at storm rises and peaks can be made to 5 minutes. The usual procedure is to prorate the error backward from the end of the time period over the number of days of record.

One method of doing this is to construct a small graph on the chart and mark off the time correction on the vertical scale and the days of record on the horizontal scale, as shown in figure 1. The following example illustrates this method.

Data From Chart

Chart time at end of period	0910
Actual time at end of period	0945
Error in chart time	35 minutes slow
Date record started	June 1, 1959
Date record ended	June 15, 1959
Number of days in period	[1]15

[1]For ease in computation, the days in which the chart is started and stopped are counted as full days; therefore 15 days is considered the period.

On the graph (fig. 1), the junction of the vertical day line with the diagonal gives the 5-minute interval correction for that day. For example: if a storm peak occurred on June 5 at 1020 (chart time), 10 minutes should be added to this time; thus 1030 is the actual time of the storm peak. Or, if a storm rise occurred at 0520 (chart time) on June 11, the corrected time is 0545. Points that fall on the junction of the horizontal and diagonal line can be assigned to the interval above or below the line by arbitrary rule.

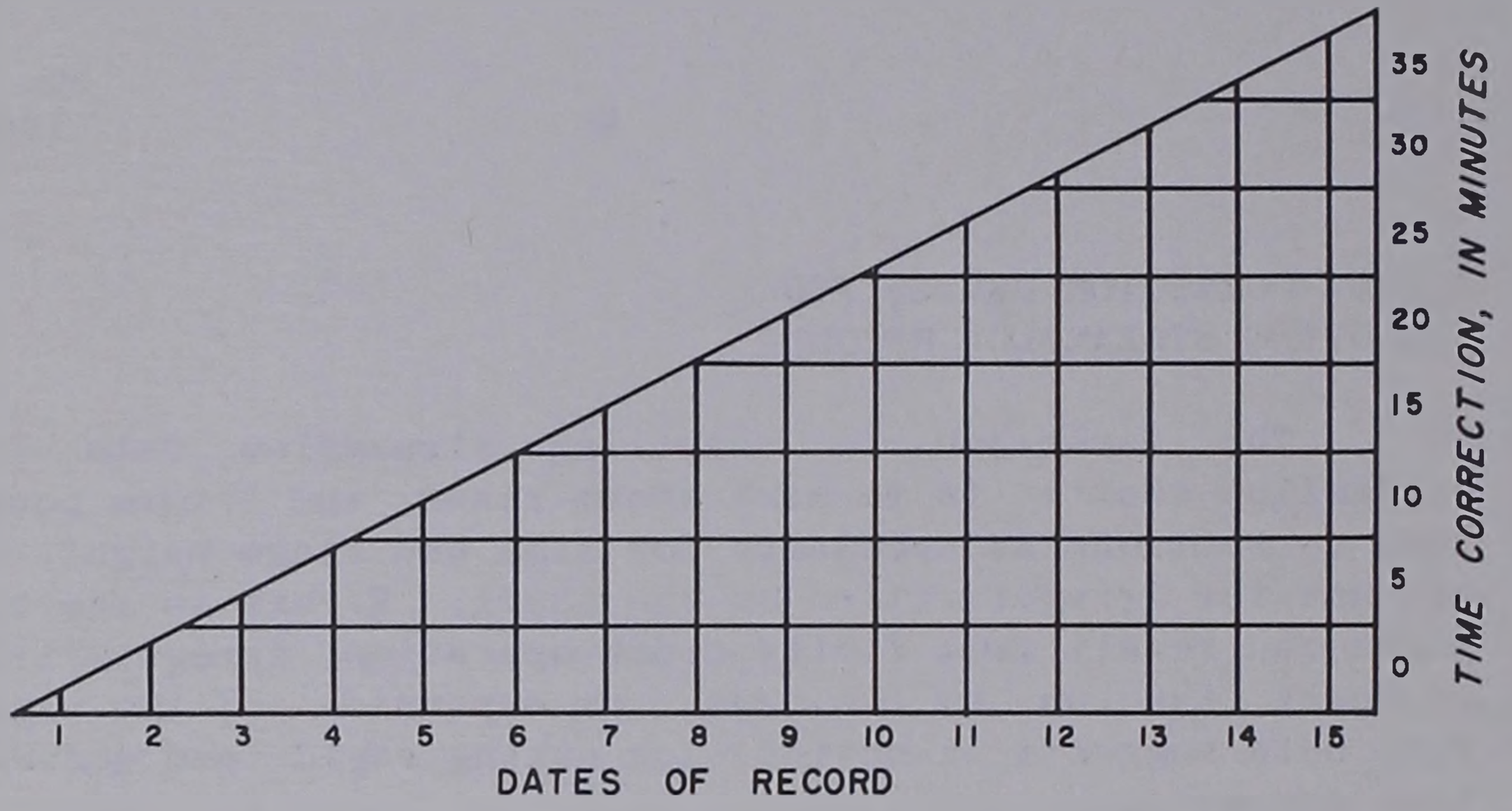

Figure 1.--Graph used for making time corrections.

Although this method is satisfactory, it requires a separate graph for each time-scale correction, and if long continuous roll charts are used the graph is covered up during the course of marking and winding.

An adjustable scale was designed to overcome these disadvantages. This device consists of a graph, permanently scribed on plexiglas, with adjustable arms for setting the most commonly-used time corrections (fig. 2). Note that the graph below the diagonal arm is similar to that shown in figure 1.

Two arms are provided to allow time corrections to be made for 8-day and 15-day periods.[2] The borders of the graph are etched to permit writing in dates of record and time adjustments.

The operation of the time corrector is as follows (using the data given in the example and figure 1): Write

[2]Streamflow charts (Stevens A-35 type) at the Hubbard Brook Experimental Forest are checked once a week and changed every second week.

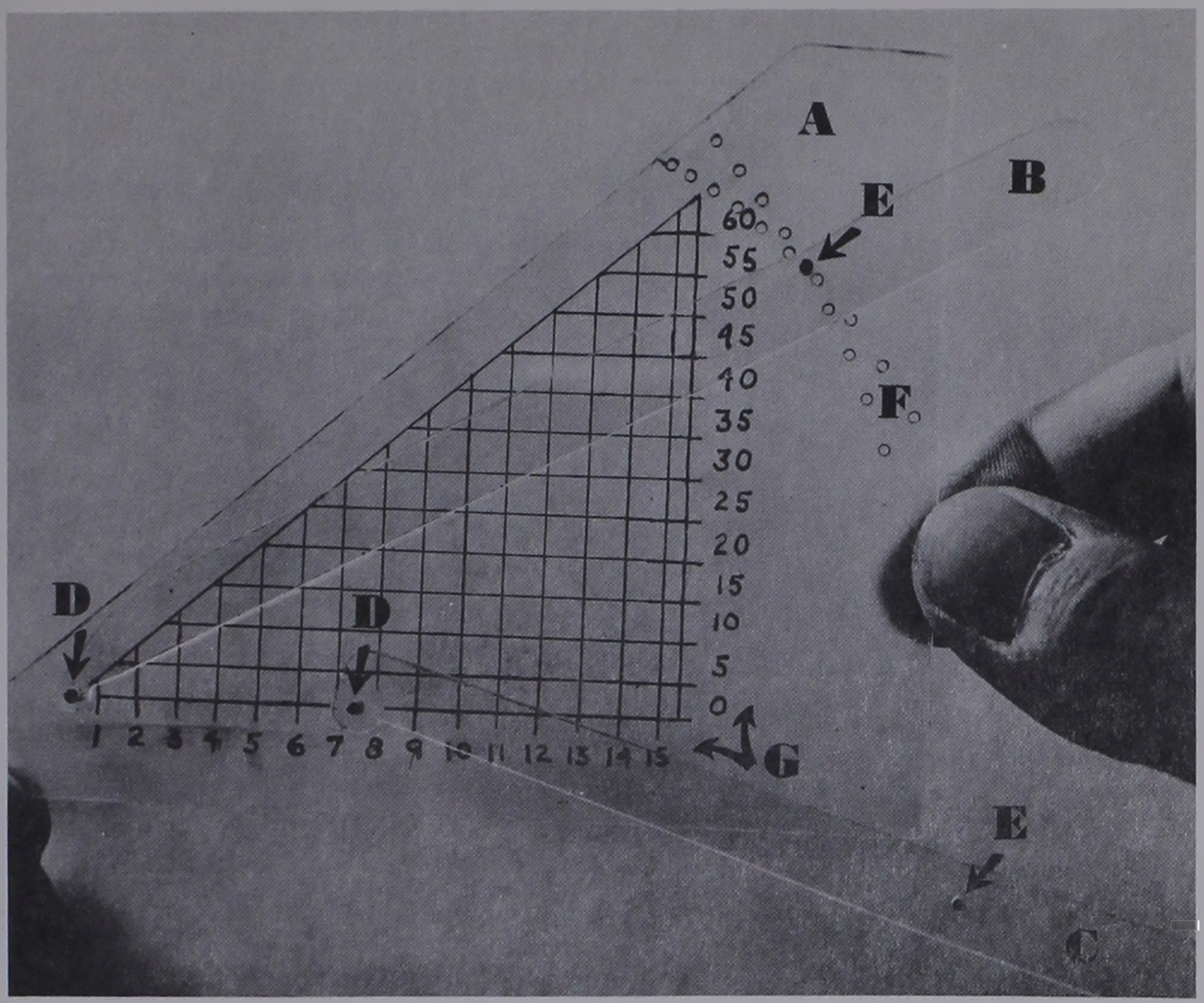

Figure 2.--The time-corrector device. *A*, the graph, scribed on 1/16-inch plexiglas; *B*, the adjustable plexiglas arm for 15-day period (reading edge on lower side); *C*, adjustable arm for 8-day period; *D*, pivot point (copper pin permanently set in plate and arm); *E*, set-pin (copper pin set in adjustable arm, engages hole in graph to position arm); *F*, positioning holes in graph; *G*, etched margins of graph for writing in dates of record and time adjustments.

dates of record along the etched part of the graph below the bottom horizontal line. Rotate the long arm on the graph (B) until its lower edge forms a straight line from the pivot point to the intersection of the horizontal line between 35 and 40 and the last vertical line to the right. Place the set-pin on the arm in its appropriate hole provided in the plexiglas plate. As in figure 1, a time correction for a storm peak on June 5 would involve a correction of 10 minutes, for June 11, 25 minutes.

If corrections are desired for an 8-day period, the same procedure is followed, using the short arm (C).

This device can be adapted for making time corrections for precipitation intensity and hygro-thermograph charts, and also for correcting any prorated error such as gage height and skew.[3]

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[3]Skew occurs when the chart is incorrectly positioned on the drum; i.e., the horizontal lines on the chart are not parallel to the drum rim.